Skills Development Scotland

Interpreting Disaggregated Data Responsibly

Guidance Document
Evaluation & Research Team

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Contents

Executive Summary

The SDS Evaluation & Research team is committed to sharing the results of its large-scale research projects to develop common evidence to support continuous improvement in policy development and delivery.

When using disaggregated results from these projects, whether that be by personal characteristics of respondents, geographical location, industrial sector or occupation, some caution must be exercised. In particular, consideration should be given to:

- Context
- Variation and uncertainty
- Representativeness/Number of respondents
- Composition effects
- Intersectionality

In short, the disaggregated results should be treated as indicative rather than definitive. Simple deductions solely from this source though are likely to be simplistic (and possibly mistaken). They may suggest areas for further enquiry, requiring further research or cross-referencing with other sources. Disaggregated results provide context, and a direct comparison with national-level results.

The Technical Appendix provides some more information, including a ready reckoner to assist users in making appropriate use of disaggregated SDS Evaluation and Research results.

Introduction

The SDS Evaluation & Research team regularly undertakes several large-scale projects underpinned by primary research, including Apprentice Voice, Pupil Voice Senior Phase, and Young People's Career Ambitions.

The team ensures that the results are robust at national level through professional questionnaire design, cognitive testing of questionnaires, and reweighting results to ensure that they are representative. This is underpinned by adherence to a strict code of ethics when conducting research, consistent with guidance from the Market Research Society and the Social Research Association. Similarly, the research activity has strict disclosure control to prevent the identification of individuals either directly or by inference.

Recently, colleagues, partners, and stakeholders have sought access to disaggregation of the primary research, be that for specific characteristics such as age or gender, for sub-Scotland geographies such as local authorities, or for specific industrial sectors or occupations.

The team is committed to sharing results on these bases, to develop common evidence and to maximise the value from the national research. However, some guidance is required to prevent the accidental misinterpretation or misrepresentation of such disaggregated results. This document provides such guidance.

Generating Robust National Results

The Evaluation & Research team lead evaluation and research projects to support evidence-based decision-making, policy development, and service improvement. By exploring the experiences and aspirations of young people, PACE customers, and apprentices, the team ensures that customer voice is at the heart of service design and delivery.

The team consists of twelve evaluation & research professionals with a range of backgrounds including economics, statistics, psychology, social research, education, and geography. The team has a wide range of experience across the public and private sectors, the third sector, and academia.

The team evaluates all SDS products and services to support continuous improvement, including gathering colleague, customer and stakeholder insight. The team also leads the SDS Collaborative PhD Programme which aims to generate new knowledge through funding skills-focused PhD topics.

The team's national-level research is designed in collaboration with an extensive range of partner organisations. Results and outputs are shared widely across the skills policy landscape to inform policy development and practice.

The team gathers a range of quantitative and qualitative data through a variety of methods. Research is conducted to high ethical standards and consent processes are built into all evaluation and research projects. Participants in research and evaluation projects must actively consent to participate and are informed about how their data will be used. Respondent confidentiality is always maintained.

Large-scale primary research is fundamental, gathering extensive feedback and insight from customer groups and stakeholders. Typically, national-level research can capture responses from thousands of individual customers. The scale of the research provides robust national-level results.

The Evaluation & Research Team produce detailed breakdowns from their national research to support individuals who wish to effectively use disaggregated findings from this primary research, whether this be at sub-Scotland geographies, for specific subgroups of the population, or for specific sectors and occupations.

For example, it may be helpful to look at research findings for a particular area in Scotland, for a particular age group, by gender, or for a particular sector or occupation. These detailed breakdowns can be useful to help inform decision making and practice, ensuring that maximum value is extracted from the large-scale primary research.

Our quantitative data is prepared and analysed by highly qualified and experienced researchers, who adhere to ethical standards and best practice when working with quantitative data. This includes practices such as data cleansing, weighting and anonymisation/pseudonymisation.

However, it is important that disaggregations from the national research are interpreted responsibly. This note provides guidance to that effect.

Typical Disaggregations

The Evaluation & Research team often produce detailed disaggregations from national evaluation or research projects. Typical disaggregations include:

Characteristic	Geography	Sector/Occupation
Gender	SDS Region	Industrial sector
Age group	Local Authority	Apprenticeship framework
Ethnicity	Scottish Index of Multiple Deprivation (SIMD)	
Disability		
Additional Support Needs (ASN)		
Care Experience		

Responsible Use of Disaggregated Data

When using detailed breakdowns as evidence to support decision making or service development, it is important to exercise caution and be aware of the following factors:

Context

National research can capture broad trends, but disaggregated results such as those at regional or local level should be placed in context. Set within this context, disaggregated results can be useful for informing service development and delivery, so long as proper consideration is given to the factors outlined in this note.

Contextual factors or variables might affect survey responses when disaggregated. Below are some examples of contextual factors that should be considered when using disaggregated results:

- Different levels of service provided for different groups of customers may affect experiences or attitudes of the service.
- Different practices or policies across regions/local authorities, for example variations in events held or face-to-face/online support for customers.
- Socio-economic or labour market conditions such as particular industries or job opportunities being more or less prominent in different areas of Scotland.
- Different Apprenticeship frameworks may affect experiences, for example variations in induction process or in how the apprenticeship is managed.

Variation and Uncertainty

Variability is a measure of the spread of data values in a population. Populations with a small variance have data values that are more tightly clustered around the mean. Survey-based research provides estimates of key variables, as it is impossible to know what the true value of each variable is in the population under study. It is important to consider the margin of error in any estimate from disaggregated data. Details of how to do so are included in the Technical Appendix to this note.

Representativeness/Respondent Numbers

Any set of responses is merely one from a large range of such potential sets. Consider the number of responses in your disaggregated results and ensure that any conclusions you draw are consistent with such considerations. The Technical Appendix provides some examples and guidance.

Composition Effects

National results produced by the SDS Evaluation and Research team are reweighted to ensure that they are representative for Scotland as a whole. Be aware of the potential impact of composition effects on disaggregated results. For example, if apprenticeship satisfaction is generally higher in sector A than sector B and your area has a preponderance of apprentices in sector A, then your average apprentice satisfaction score will be higher, due to this composition effect.

Intersectionality

Respondents can have multiple characteristics, so it's important to consider intersectionality when looking at disaggregated results. Give consideration as to how overlapping identities such as gender and ethnicity may shape respondents' experiences. Intersectional groupings often have small sample sizes in disaggregated data.

Accuracy and Precision

The primary research undertaken by the SDS Evaluation and Research team produces estimates of the true value of a particular indicator, such as user satisfaction with the careers guidance service. Ideally, these estimates need to be close to the true value, to ensure that

policy and delivery is based upon robust evidence. But the true value is unknown, and how close is close enough? That brings into play the notion of accuracy and precision in estimates.

Accuracy determines confidence in the results, whereas precision identifies the maximum margin of error which can be tolerated. In practice, most organisations use a 95 per cent confidence measure of accuracy – they can be sure that 95 per cent of the time, the confidence interval associated with any estimate will contain the true value. The maximum margin of tolerable error is a choice dependent on context.

More information, and a ready reckoner, are included in the Technical Appendix.

Further Guidance and Support

If you have any questions or would like further guidance on interpreting disaggregated research and evaluation results, please get in touch with the Evaluation & Research team at Evaluation&Research@sds.co.uk.

Technical Appendix

Introduction

The SDS Evaluation & Research team is committed to sharing the results of its large-scale research projects to develop common evidence to support continuous improvement in policy development and delivery.

There are two main sources of error in survey research: non-sampling errors and sampling errors. These are outlined below:

Non-sampling errors

Non-sampling errors can include factors such as:

- **Coverage error** – where the sampling frame may not adequately represent the target population
- **Non-response error** – where respondents to any research survey have significantly different characteristics from non-respondents
- **Measurement error** – where the information collected is not accurate, or is not the information sought
- **Survey instrument (questionnaire) error** – where the questionnaire design and pre-coding of some responses can affect the quality of responses
- **Respondent error** – where the respondent's answer to a question is not the true answer. This most commonly occurs through ambiguous or poorly worded questions
- **Data processing errors** – where the collection or processing of survey responses introduces changes to the original response

Through thorough research design, cognitive testing of questionnaires and reweighting of responses, the SDS Evaluation and Research team takes all reasonable steps to minimise non-sampling errors in its work.

Sampling errors

Sampling errors occur because any sample, such as the set of respondents to a survey, is merely one of many such potential samples which could have occurred. When estimating the margin of error for any estimate produced from disaggregated results, it is important to consider both accuracy and precision. Accuracy determines the confidence in the results produced, whereas precision identifies the maximum tolerable error.

What does all that look like in practice? Let's say we're interested in estimating how satisfied recent Scottish school leavers are with their current status, whether they're in employment, at university or college, or undertaking an apprenticeship. At the national level, there are approximately 55,000 school leavers each year. From the Young People's Career Ambitions research, the estimate of satisfaction with their current status is 83 per cent, based on almost

3,000 responses. From this, we can be 95 per cent confident that the true level of satisfaction is somewhere between 82 per cent and 84 per cent.

What about at the local level? Let's say we have 1,000 recent school leavers in our area, with a status satisfaction estimate of 83 per cent, based on 180 respondents. From this, we can be 95 per cent confident that the true level of satisfaction is somewhere between 78 per cent and 88 per cent.

As these examples show, when the national level research responses are disaggregated, the margins of error associated with estimates tend to increase.

The following table provides an indication of the required sample size to achieve a given margin of error by population size. Please note that these are based on a point estimate of 50 per cent. So, for a population of 10,000, if there are 370 responses, and our estimate is that 50 per cent of respondents are satisfied with our service, then we can be 95 per cent confident that the true satisfaction value in the population is 50 per cent plus or minus 5 per cent i.e. that the true satisfaction value is between 45 per cent and 55 per cent.

Population	Margin of error ±									
	1%	2%	3%	4%	5%	6%	7%	8%	9%	10%
100	99	96	92	86	80	73	66	60	54	49
200	196	185	169	150	132	115	99	86	75	65
300	291	267	234	200	169	141	119	100	85	73
400	384	343	291	240	196	160	132	109	92	78
500	475	414	341	273	217	174	141	116	96	81
1,000	906	706	516	375	278	211	164	131	106	88
2,000	1655	1091	696	462	322	235	179	140	112	92
3,000	2286	1334	787	500	341	245	184	143	114	93
4,000	2824	1501	843	522	351	250	187	145	115	94
5,000	3288	1622	880	536	357	253	189	146	116	94
6,000	3693	1715	906	546	361	255	190	146	116	95
7,000	4049	1788	926	553	364	257	191	147	117	95
8,000	4365	1847	942	558	367	258	191	147	117	95
9,000	4646	1896	954	563	368	259	192	148	117	95
10,000	4899	1936	964	566	370	260	192	148	117	95
50,000	8057	2291	1045	593	381	265	195	150	118	96
100,000	8763	2345	1056	597	383	266	196	150	118	96
500,000	9423	2390	1065	600	384	267	196	150	119	96
1,000,000	9513	2395	1066	600	384	267	196	150	119	96

A quick ready reckoner is also available for determining appropriate sample sizes – this answers the question

What proportion of the target population do you need to interview to get results representative of the target population with the level of confidence that you are willing to accept?

https://www.qualtrics.com/blog/calculating-sample-size/

Estimating the Margin of Error - A detailed worked example

Perhaps you wish to estimate the margin of error, in which case a worked example should help (or you can use an online tool like https://www.calculator.net/sample-size-calculator.html):

Let:

- **p** = sample proportion
- **n** = sample size (the number of respondents)
- **N** = population size
- **Z** = z-score corresponding to the desired confidence level (1.96 for 95% confidence, 2.58 for 99% confidence)

Then the margin of error (ME) is calculated as:

$$ME = Z \times \sqrt{[\,(p(1-p)/n) \times ((N-n)/(N-1))\,]}$$

Notes:

- The term ((N - n) / (N - 1)) is known as the finite population correction (FPC) factor.
- If the population size N is very large compared to the sample size n, the FPC factor approaches 1 and can be omitted.

Example:

We have a population of 10,000, from whom we gathered 370 responses. From those 370 responses, 50% said that they were satisfied with the service offered – but this is only an estimate, based on that particular sample of respondents. We want to calculate a range within which we can be 95% confident that the true satisfaction of the overall population lies.

So

p=50% (=0.5)
n=370
N=10,000
Z=1.96 (as our desired confidence level is 95%)

$$ME = Z \times \sqrt{[\,(p(1-p)/n) \times ((N-n)/(N-1))\,]}$$

Becomes

$$ME = 1.96 \times \sqrt{[\,(0.5(1-0.5)/370) \times ((10{,}000-370)/(10{,}000-1))\,]}$$

$$ME = 0.05$$

And our margin of error is therefore ±5%.

Our 95% confidence interval for the proportion (p) is p ± ME, which is [45%,55%]. So, we can be 95% confident that the satisfaction level within the population is between 45% and 55%.

You can now 'plug in' your own values of **p**, **n**, **N**, and **Z** into this equation to calculate the margin of error in your estimate.

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